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ABSTRACT

A long-term project entitled Agricultural Manpower Needs in North Dakota examined current and projected agriculture manpower needs in the state. Objectives of the project were to develop a methodology for obtaining and interpreting agricultural manpower needs data for North Dakota, to determine emerging employment trends and identify emerging occupations in agriculture, and to determine training needs for projected agricultural employment in the state. Included among the project activities were investigation of a method for estimating and projecting manpower needs from published data sources and implementation of surveys to gather data from agribusiness firm managers concerning employment totals, replacement needs, and preferences for training and experience. Researchers concluded that while published data sources such as County Business Patterns and the National Manpower Study can be used to help estimate manpower needs in agriculture, these published data sources have a variety of limitations. For instance, categories used in these data sources are sometimes difficult to match with business organization patterns, and data are often dated. Recommendations called for direct surveys of agricultural businesses to gather manpower data and for regional/national planning and coordination to improve the effectiveness of such research. (MN)

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DETERMINING MANPOWER NEEDS IN AGRICULTURE

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INTRODUCTION

A project entitled Agricultural Manpower Needs in North Dakota was begun in 1977. This long term project is funded by the North Dakota Agricultural Experiment Station and is expected to continue at least until September of 1982. The first phase, dealing with projecting and estimating manpower needs, was completed in 1978. Data has been gathered by surveys for several agribusinesses and this effort is continuing. Other research emphasis areas including re-training and upgrading needs for workers are planned for the near future.

Three graduate level studies have been completed as part of this project. Douglas Brahee (2) investigated a method for estimating and projecting manpower needs from published data sources. Jerome Migler (3) and Keith Rheault (4) gathered data directly from agribusiness firm managers concerning employment totals, replacement needs and preferences for training and experience. This paper is based upon data from these three studies.

The data itself in this study is of primary interest and value to residents of North Dakota. The methods, however, have implications for others interested in examining procedures for estimating manpower and training needs.

Need for the Study

Employment in North Dakota, including entrepreneurship, in the agricultural sector is of major importance in both economic and human terms. Consequently, preparation for agricultural employment, as well as the associated upgrading and re-training, is of major importance in educational programs of the State. Reliable and up-to-date information concerning agricultural employment in North Dakota is then a key decision-making tool for use in the planning and implementation of educational programs designed to prepare workers for the major industry of the State.

Such agricultural manpower needs data are essential for planning Vocational Education programs in agriculture for secondary students, post-secondary students and adults served through public secondary and post-secondary schools in North Dakota. These data would also have implication for planning higher education programs in agriculture, including those at North Dakota State University.

Adequate manpower needs data can also serve a most useful purpose in career counseling and vocational guidance. Career planning, though appropriate in terms of ability and interest, must also be realistic in terms of employment opportunities.

OBJECTIVES

The objectives for the total project include:

1. To develop a methodology for obtaining, maintaining, updating and interpreting agricultural manpower needs data for North Dakota.

2. To determine the extent of agricultural employment in North Dakota including needs due to replacement and changes in scope caused by expansion or decline.

3. To determine emerging employment trends and identify emerging occupations in Agriculture in North Dakota.

4. To determine training needs for projected agricultural employment in North Dakota.

In addition each of the studies completed as part of the project have had specific objectives contributing to the attainment of these four major objectives. One of these studies dealt mainly with objective number one, developing a method for estimating manpower needs. The other studies have contributed to the attainment of the three remaining objectives.

METHODS

This project included an effort to estimate manpower data from existing sources followed by survey procedures to gather data directly from managers of agribusiness firms. Brief descriptions of both methods are included here.

Literature Review

There seemed to be a lack of agreement among researchers as to the most appropriate methods for conducting research for manpower needs in Agriculture. While there were some similarities, no two studies appeared to be similar in design or implementation. These studies indicated that similar objectives could be obtained using various methods and procedures. It appears that the design of the studies reviewed depended to a large extent upon the resources available for the research as well as the nature of the agribusiness employment within the state or area to be studied.

Estimating Manpower Needs From Published Sources

A method for estimating manpower needs from certain published data sources was first developed. The two data sources used were the National Manpower Study (Economics Research Service, et.al., 1973) (1) and County Business Patterns (United States Department of Commerce, 1968-1973) (6). The 1973 County Business Patterns was the latest available at the time of the study. County Business Patterns is published for each state. It contains data enumerating employees in various industry classifications of the state for the mid-March

pay period for each year. Industries are classified according to the Standard Industrial Classification (SIC). This publication does not indicate which, if any, of these employees need skills or competencies in Agriculture nor are any occupations listed.

The National Manpower Study included data for each state according to occupation and industry in Agriculture. In each occupation the number of employees needing agricultural competencies was indicated. In utilizing this data from the National Study two classifications or sections were used. They are: "Occupations that require or utilize agribusiness competencies in any industry where hired" and "Occupations that require or utilize agribusiness competencies only in selected industries."

The industry classification system was not the same in the County Business Patterns and the National Manpower Study. The County Business Patterns data was tabulated by a method developed by Stevens (1971) (5). This was done to provide as many compatible classifications as possible. Thirteen such categories were established.

The National Manpower Study with the base year of 1970 was used to determine the number of persons that year in selected agricultural businesses or industries who used agricultural competencies. Using total employment data from the County Business Patterns reports linear regressions were calculated to project to the year 1980 the total employment within each selected agricultural industry. The projected total employment figure for 1980 was then multiplied by the percentage figure calculated from the National Manpower Study to provide a projected number of employees in the industry needing agricultural competencies in the year 1980. This method was used to estimate employment needs in 13 selected industries.

Figure one is an illustration of this projection of estimated employment needs in dairy products manufacturing in North Dakota. The total employment in this industry was 958 with 61 or 6.5% requiring agricultural competencies according to the National Manpower Study. The projected total employment figure for 1980 was 1144 with 74 workers needing agricultural competencies using the 6.5% figure as a multiplier.

Comparing Projected Data to Survey Data

The total employment needs in manufacturing dairy products for 1980 as projected from County Business Patterns data was 1144. (Table 1). This compared closely with the figure of 1121 which was estimated by the managers of these firms. Using a percentage multiplier from the National Manpower Study, it was projected that 74 of these workers would need agricultural competencies. The managers of the dairy products firms reported that 270 workers should have competencies in Agriculture. A more complete description of the needs as seen by the managers is found in Table 2.

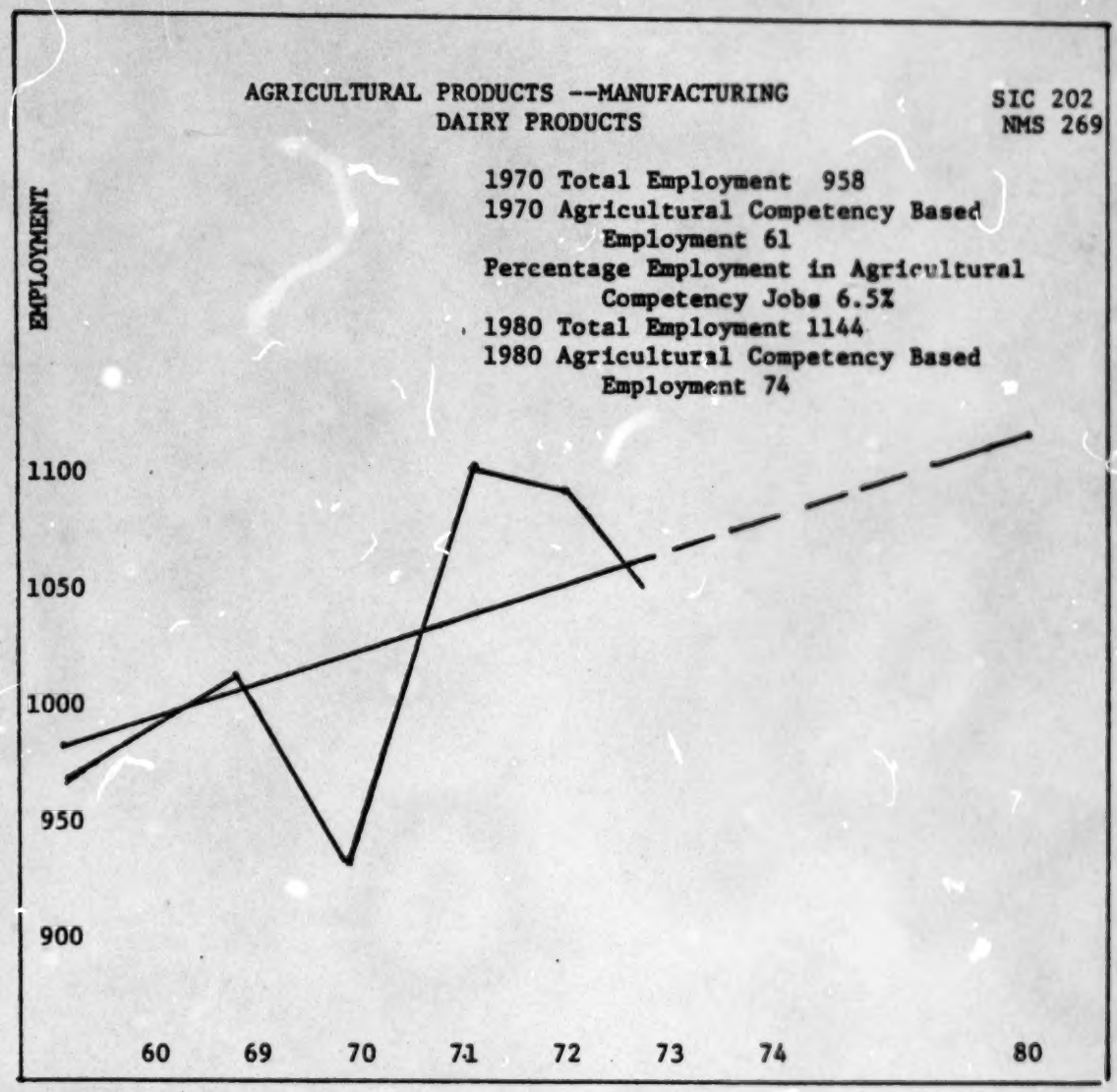
AGRICULTURAL PRODUCTS --MANUFACTURING
DAIRY PRODUCTS
SIC 202
NMS 269
1970 Total Employment 958
1970 Agricultural Competency Based Employment 61
Percentage Employment in Agricultural Competency Jobs 6.5%
1980 Total Employment 1144
1980 Agricultural Competency Based Employment 74
EMPLOYMENT
1100
1050
1000
950
900
60
69
70
71
72
73
74
80

FIGURE 1

TABLE 1
DATA PROJECTED FROM PUBLICATIONS COMPARED TO SURVEY DATA

	Projections from Published Data	Estimates from Survey of Managers
Total Number of Employees in 1980	1144	1121
Workers Needing Agricultural Competencies	74	270

TABLE 2
TOTAL PROJECTED EMPLOYMENT FOR NORTH DAKOTA DAIRY PRODUCTS INDUSTRY, 1977 and 1979 THROUGH 1983

Year	Estimated Full-time Employees	Estimated Part-time Employees	Estimated Total Employment	Est. Annual Replacements	
				Full Time	Part Time
1977	1,013	116	1,129	107	39
1979	990	148	1,138	105	49
1980	986	135	1,121	105	45
1981	982	140	1,122	104	47
1982	987	140	1,127	105	47
1983	987	140	1,127	105	47

Data Gathered by Direct Mail Survey

Data was gathered by direct mail survey with follow-up in some cases by telephone, for six North Dakota agribusiness industries. These were agricultural equipment and machinery, grain handling, dairy products, horticulture, meat processing and veterinary services. The tables that follow provide an illustration of the type and scope of information gathered. The number of tables and amount of data gathered is too extensive to be included in this paper.

Employment in the dairy products business as provided by managers is included in Table 2. Full-time and part-time employment estimates are included as well as estimated replacement needs. Similar data were gathered for the other five business sectors.

Table 3 contains an illustration of employee needs by occupations in the grain industry in North Dakota. Also included is an estimate of the percentage of each group needing competencies in agriculture.

These data are also available for each of the other survey studies conducted.

TABLE 3
ESTIMATED FULL-TIME AND PART-TIME POSITIONS,
AND AGRICULTURAL ABILITY REQUIREMENTS BY OCCUPATIONAL CATEGORIES
GRAIN INDUSTRY, 1977

Occupation	Estimated No. of Full-Time	Part-Time	% Requiring Ag. Abilities[a] Full-Time	Part-Time
Elevator Employee (General Work)	610	434	58	28
Manager	526	4	83	67
Assistant Manager	433	13	81	89
Secretary/Bookkeeper	213	119	40	29
Truckdriver	91	60	47	40
Fertilizer Specialist	37	7	73	100
Bookkeeper (Only)	30	46	33	25
Feed Specialists	29	9	75	100
Warehousemen	19	4	15	67
Secretary (Only)	7	3	—	50
Others	43	24	50	12

[a]Figures rounded to nearest whole percent

Employers were asked to state preference of training needed for the various occupations within their businesses. An example of the response to this request is shown in Table 4 which illustrates employer preference for education in the veterinary service business. A high degree of preference was noted for post-secondary vocational education.

Managers of each firm were also asked to state their preferences concerning amount of experience for each occupation. Responses for meat processing industry managers are shown in Table 5. Employers preferred one or two years of experience for many occupations.

These tables are provided as an illustration or sampling of the data gathered by the survey method. They are not intended to provide a complete presentation of these data.

TABLE 4

EDUCATIONAL TRAINING DESIRED FOR NORTH DAKOTA
VETERINARY SERVICE OCCUPATIONS

Job Title	No. of Employer Responses	Percent of Employers Specifying Each Preparation					
		No Training Needed	High School		Vocational		Four Year College
			General Courses	Vocational Program	Technical Program	Junior College	
Secretary/bookkeeper/ receptionist	33	---	30.3	15.2	42.4	12.1	---
Animal Handler	24	37.5	25.0	25.0	12.5	---	---
Animal technician/ veterinary assistant	23	4.3	21.7	---	52.2	17.4	4.3
Animal technician/ secretary/bookkeeper/ receptionist	5	---	20.0	---	80.0	---	---
Others	7	28.6	42.9	14.3	---	---	14.3

TABLE 5

YEARS OF WORK EXPERIENCE DESIRED BY EMPLOYERS
FOR HIRING EMPLOYEES IN NORTH DAKOTA
MEAT INDUSTRY OCCUPATIONS

Job Title	No. of Employer Responses	Percent of Employers Specifying Work Experience Desired						
		None Required	One Year	Two Years	Three Years	Four Years	Five Years	Six or More Years
Manager	26	19.2	15.4	7.7	3.9	19.2	19.2	15.9
Meat cutter	24	16.7	37.5	20.8	16.7	---	8.3	---
Utility person	24	50.0	16.7	16.7	4.2	---	12.5	---
Butcher	18	22.2	50.0	16.7	---	---	---	20.0
Sausage-meat trimmer	13	38.5	46.1	7.7	---	---	7.7	---
Office personnel	12	8.3	25.0	58.3	---	8.3	---	---
Deliveryman	9	55.6	33.3	11.1	---	---	---	---
Processor	9	55.6	22.2	11.1	---	---	11.1	---
Lockerplant worker	8	37.5	50.0	12.5	---	---	---	---
Maintenance person	8	50.0	12.5	25.0	12.5	---	---	---
Salesman	7	28.6	---	14.3	28.6	14.3	14.3	---
Slaughterhouse worker	7	28.6	42.9	14.3	---	---	14.3	---
Truckdriver	6	37.5	---	62.5	---	---	---	---
Meat wrapper	5	---	80.0	20.0	---	---	---	---
Buyer	5	---	20.0	---	40.0	---	20.0	20.0
Warehouse worker	1	---	100.0	---	---	---	---	---
Others	6	33.3	---	33.3	---	---	---	33.3

RESULTS AND CONCLUSIONS

Results

A method of estimating employment needs in Agriculture from County Business Patterns and the National Manpower Study was developed. The relationship between these two sources was such that estimates were possible in selected industries. Agricultural employment needs estimates for thirteen agribusiness industries were developed and projected from the two published sources.

The direct mail survey method has been used to determine the number of employees in each of the six agribusiness industries surveyed. The data available include number of full-time and part-time employees in each of several occupations as well as the training and experience required or preferred by the employers. This information is being made available to employers and educators.

The estimate of employment needs in dairy products manufacturing as projected from published sources has been compared to data secured by survey and found to agree closely for total employment needs. The managers reported a higher number of employees needing agricultural competencies than those indicated in the National Manpower Study.

Conclusions

1. Published data sources such as County Business Patterns can be used in some cases to help estimate manpower needs in Agriculture.

2. Categories used in published data are sometimes difficult to match with business organization patterns.

3. These published data have limitations in terms of being dated and also because the payroll data from which employment figures are obtained is for mid-March. This is a time of very low employment in some agricultural businesses, especially in northern states. This may result in a considerable under-estimation, especially for part-time workers.

Recommendations

1. Direct surveys of agricultural businesses should be used to gather manpower data.

2. Published data sources such as County Business Patterns should be used when appropriate to save time and cost in making employment estimations but must be used with considerable care.

3. Regional and/or national planning and coordination should be carried out to improve the effectiveness of agricultural manpower needs research. Regional research projects through Experiment Station funding should be considered.

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